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Documentation Update

Just over a year ago, UTCS established the UTCS GUIDE TO PRODUCTS AND SERVICES (GPS) as the first step toward reorganizing and updating its user documentation. Since then, four UTCS Catalogues and twenty-three UTCS Guides have been published. A list of published documents appears in each issue of *COMPUTERNEWS* under the title "New UTCS Documents." Many of the Guides are available online, where they can be easily kept up to date; the first Catalogue, Access, is presently under review in anticipation of its first annual update.

Early in October, two of the three introductory sections of GPS were published. Together, they replace the USERBOOK modules 1.0, 3.0, 3.1, 3.2 and 3.3System Software. The first section, UTCS GPS: Introduction, provides an overview of UTCS organization, products and services. It describes software support policy and contains a directory to all of the services and support personnel available to users. It also explains the organization of GPS and its role in UTCS' long range documentation plans.

The second introductory section, GPS: Basics, supplies all of the nuts and bolts information: general descriptions and locations of hardware, data storage facilities, site locations and normal hours.

The third section, GPS: Accounting, is also available now. It replaces USERBOOK 2.0 and is intended largely as a guide for those who must administer departmental computing. However, it also contains information useful to any individual who pays for his/her own computing.

The success of GPS as documentation depends in part on easy access to the documents available only online. To simplify this on the IBM MVS system, the IBM Document Printing Service was set up last spring. This is used through the DO DOCUMENT command in WYLBUR, and the DOCUMENT command in TSO. These have been modifed recently, and the new DOCUMENT command has now been installed on TSO. To find out more about it, see "New DOCUMENT Command on TSO" elsewhere in this issue.

Martha Parrott

Subscription Renewals

In keeping with the policy announced last year, it is now time for *COMPUTERNEWS* readers to renew their subscriptions. Because all subscriptions run from January to January, even new users, who became subscribers automatically when they opened their accounts, must renew at this time if they wish to continue receiving *COMPUTERNEWS.*

To renew, just fill out the Annual *COMPUTERNEWS Subscription Renewal Form* appearing at the back of the October/November and December issues. Any subscription not renewed by the beginning of January will be dropped.

Please remember that this policy helps us keep our mailing costs down and continue to provide the newsletter free of charge.

Martha Parrott

NetNorth Update

In the July/August issue of *COMPUTERNEWS,* we announced the NetNorth computer network which connects a number of Canadian universities and colleges. Since that article was written, several new members have been added to NetNorth. The following is the most up to date list of NetNorth nodes:

Table 1

Current NetNorth Members

Institution	*Place*	*Node Name*	*Operating System*
Carleton University	Ottawa	CARLETON	
Centennial College	Toronto	CENCOL	VM/SP
Humber College	Toronto	HUMBER	VM/SP3
McGill University	Montreal	MCGILL1	VM/SP3
McMaster University	Hamilton	MCMASTER	VMS/jnet
National Research Council	Ottawa	TSSNRC00 VMNRCOL	TSS VM/SP
Queen's University	Kingston	QUCDN QUCIS	VM/SP3 UNIX
Ryerson P.I.	Toronto	RYERSON CATE	VM/SP2 VM/SP3
University of Waterloo	Waterloo	WATACS WATARTS WATCSG WATDCS WATDCSU WATMNET WATROSE	VM/SP3 UNIX VM/SP3 VM/SP3 UNIX VM/SP3 UNIX
University of Guelph	Guelph	UOGUELPH UOGVAX2	VM/SP3 UNIX
University of Ottawa	Ottawa	UOTTAWA	VM/SP3
University of Toronto	Toronto	UTORONTO	VM/SP3
York University	Toronto	YORKVM1 YORKVM2 YULEO YUURSA YUVENUS YUORION YUGEMINI	VM/SP3 VM/SP3 VMS/SP3 VMS/jnet VMS/jnet VMS/jnet VMS/jnet

Table 2

Potential NetNorth Members

Concordia University	Montreal, P.Q.
University of Windsor	Windsor, Ontario
University of Manitoba	Winnipeg, Manitoba
Laurentian University	Sudbury, Ontario
Lakehead University	Thunder Bay, Ontario
University of Western Ontario	London, Ontario

We are now connected to: BITNET, the U.S. equivalent of NetNorth, and to ERN, the European Research Network. We should be able to publish a current list of node names in the next issue of *COMPUTERNEWS.*

Mary Ann Cervin-Lawry

New TSO Course

UTCS has offered Noncredit Short Courses for many years to help our customers use computing facilities effectively. This November, a new style of course will be offered for the first time. It is an introduction to the SAS statistical package for new users who have not used fullscreen TSO or WYLBUR on the IBM mainframe before. What is new is that two skills will be taught in an integrated fashion: accessing computer facilities interactively using fullscreen TSO and doing basic statistical analysis with the SAS package. This approach will allow students to write and run SAS programs very early in the course and practice new SAS skills as soon as they have been taught.

In the past, SAS101 has been offered as an introduction to the SAS package. The new SAS/TSO101 course is a response to needs seen in the course evaluations and seen by Advising Services in their day to day interactions with users. Most users need con-

continued...

New TSO Course continued

siderable practice to supplement theory if they are to be productive after a short course. When workshop sessions were first added to supplement SAS101, it was found that considerable time was spent reteaching interactive skills instead of practicing the SAS skills. The workshop segments of SAS/TSO101 are designed to provide immediate exposure to SAS programs and to develop interactive skills gradually as a user's ability to use SAS increases.

At the end of SAS/TSO101, users will know how to access SAS through fullscreen TSO from UTCS public terminals, from their office, or from home by telephone. Using the ISPF facility on TSO, users will be able to create, modify, use, and remove data files needed in their research. With SAS, they will be able to produce descriptive statistics, display data in charts and plots, and prepare data for more detailed statistical analysis. In the SAS/TSO101 course, SAS programs are submitted as Batch jobs for processing. Students will have the necessary background after this course to use the fullscreen SAS products with only a small amount of additional training.

The design of this course has been a joint effort of several groups within the User Interface Group at UTCS. Although the initial goal was to produce a SAS/TSO course, the specifications for the TSO modules were created by Advising Services, the Imaging/Humanities Support Group and the SNAC Support Group so that these modules could later be used as part of a TEXT/TSO or FORTRAN/TSO course. Detailed implementation of instructor notes, student handouts, and visual aids for TSO modules has been the responsibility of Advising Services. SAS modules for the course and workshop exercises have been implemented by the SNAC Support Group. Initially, SAS/TSO101 will be taught by members of the SNAC Support Group.

A SAS/TSO101 course is scheduled for November 26, 1984 through December 7, 1984. It will meet each morning from 10:00 until 12:00 for these ten days in the UTCS Education Facility, Room 221, McLennan Physical Laboratories. This provides 20 contact hours, similar to the 18 hours required to take DDS101, WYL101, and SAS101 in the past. Since this is a hands-on course, users must have a valid TSO access code for use in the course. Anyone interested in the SAS/TSO101 course must register in person with:

Educational Services Support Specialist
Engineering Annex, Room 207
978-4565

Bill Fehlner

New Internal Rate Schedule

Effective July 1, 1984, UTCS has adjusted the charges for several items in the services currently offered. The Xerox 8700 laser printer, the GP UNIX service, and the charging scheme for output are affected.

The UTCS Internal Rate Schedule in its entirety follows.

UNIVERSITY OF TORONTO COMPUTING SERVICES INTERNAL RATE SCHEDULE

Effective July 1, 1984 (UTCS reserves the right to change rates without notice)

IBM 3033/N12 Processor

SERVICE	DEFINITION	CHARGES
BATCH SERVICE	General Purpose Job Stream (GPJS)	
Charging Algorithm	SF x (CPU + IOUSE + URC + PDC)	
SF [1]	Service Factor is 2 for Priority 8; 1 for Priority 6 (default).[1]	
CPU	Charge for use of the central processing unit (CPU)	$16.00/CPU minute
IOUSE [2]	Charge for Input-Output (IO) usage	$ 0.35/1000 IOUSE [2]
URC	Unit Record Charge	$ 5.00/1000 cards read + $10.00/1000 cards punched +
	line (impact) printer	$ 0.10/page [3]
	laser (xerographic) printer	$ 0.023/page [4]
PDC	Peripheral Device Charge	$ 2.00/tape mount +
	line (impact) printer forms mount	$ 3.25/mount [3]
	laser (xerographic) printer forms mount	$ 2.00/mount [4]

[1] A customer's choice of Priority affects job turnaround. Priority 6 jobs (SF=1) generally execute after Priority 8 jobs (SF=2).

[2] IOUSE = Disk EXCPs + Tape EXCPs + VIO Pages
EXCP is the transfer of one block of data between memory and disk or tape. EXCP is an acronym for Execute Channel Program.
VIO Pages = VIOPAGEIN + VIO PAGEOUT + VIO RECLAIM
VIO PAGEIN is the transfer of one page (4096 bytes) of data from disk to memory. VIO PAGEOUT is the reverse. VIO RECLAIM is the re-assignment of a page which was scheduled for page out. This figure is necessary to ensure that the total VIO page count is reproducible.

[3] See Appendix A for a discussion of available forms and the page charging algorithm for impact printers.

[4] See Appendix C for a discussion of available forms and the page charging algorithm for the laser printer.

SERVICE	DEFINITION	CHARGES
CLASS E	Class E is a batch service designed for programs which require substantial machine resources and do considerable number crunching. Class E jobs generally do not start execution before midnight and overnight turnaround is not guaranteed.	
Charging Algorithm	(0.05 x CPU) + (IOUSE + URC + PDC) **NOTE:** CPU, IOUSE, URC and PDC have the same meanings and charges as in the Batch service. Further details on Class E can be found in the UTCS Guide to GPJS.	
Interactive Services		
TSO	Time Sharing Option	
Session Charge	CPU + IOUSE + CTC	
CTC	Connect Time Charge	$ 1.50/hour (prime time) [5] $ 1.00/hour (otherwise)
	NOTE: For the TSO service, CPU and IOUSE have the same meaning as in the Batch Service.	
WYLBUR		
Session Charge	CPU +IOUSE + CTC	
CTC	Connect Time Charge	$ 1.50/hour (prime time) [5] $ 1.00/hour (otherwise)
	NOTE: For the WYLBUR service, CPU and IOUSE have the same meaning as in the Batch Service.	

UNIVERSITY OF TORONTO COMPUTING SERVICES INTERNAL RATE SCHEDULE

Effective July 1, 1984 (UTCS reserves the right to change rates without notice)

IBM 3033/N12 Processor

SERVICE	DEFINITION	CHARGES
Interactive Services	(Continued)	
I.P. SHARP APL	The I.P. SHARP version of APL.	
Session Charge	CPU + CTC	
CPU	Charge for the use of the central processing unit in CPU Units.[6]	$ 2.22/1000 (prime time)[5] $ 1.48/1000 (otherwise)
CTC	Connect Time Charge	$ 1.50/hour (prime time)[5] $ 1.00/hour (otherwise)
HSPRINT	Printing generated via the APL utility HSPRINT. Charges are the same as the Unit Record Charges (URC) for the IBM Batch Service (see above).	
Dump/Restore	A customer requested workspace/file dump/restore from tape	$20.00/request

NOTE: N tasks and B tasks are not charged for Connect Time.

[5] Prime Time is Monday to Friday from 08:00 to 19:00 hours excluding holidays. **The highest rate applicable during any part of a session will be the rate used to charge for the entire session.** Nonprime time rates are two-thirds of prime time.

[6] For I.P. Sharp APL, a CPU Unit is approximately 0.004 CPU seconds on the IBM 3033/N12 processor.

OTHER CHARGES

SERVICE	DEFINITION	CHARGES
Online Storage	One track consists of 47476 bytes	$ 0.020/track/day
I.P. Sharp APL Online Storage	One block of **workspace** storage (4196 bytes) One block of **file** storage (3156 bytes)	$ 0.00173/block/day $ 0.00138/block/day
Offline Storage	Customer supplied tape (one month minimum charge) UTCS rented tape (one month minimum charge)	$ 2.00/tape/month $ 2.50/tape/month

COMMUNICATIONS SERVICES

SERVICE	DEFINITION	CHARGES
Dedicated Synchronous Access	Dedicated RJE port at 9600 bps or less	$2000/year.
Dial-in Synchronous Access	Connect time charge	$13.00/hour

NOTE: Dial-in RJE port facilities are provided only at 2400 bps using Bell 201-C or equivalent modems.

SERVICE	DEFINITION	CHARGES
Dedicated Asynchronous Access	Dedicated PACX port up to 4800[7] bps	$60.00/year

[7] The maximum supported speed varies with the machine being accessed. Once a connection is established to one of the UTCS mainframes, the user is charged the rates quoted in this schedule for resources consumed.

NOTE: Customers who wish to connect their own systems or terminals to UTCS computers should contact UTCS Hardware and Communications staff to discuss hardware and/or software requirements.

UNIVERSITY OF TORONTO COMPUTING SERVICES INTERNAL RATE SCHEDULE

Effective July 1, 1984 (UTCS reserves the right to change rates without notice)

SERVICE	DEFINITION	CHARGES

DECsystem-1090

Session Charges

Charging Algorithm	CPU + MEMUSE + IOUSE + CTC	
CPU	Charge for the use of the central processing unit (CPU)	$ 5.00/CPU-min (prime time) [1] $ 3.00/CPU-min (otherwise)
MEM	Memory usage measured in kiloword, CPU minutes (kw-min)	$ 0.15/kw-min (prime time) [1] $ 0.09/kw-min (otherwise)
IOUSE	Disk input-output. One block is 128, 36-bit words (640 characters)	$ 0.50/1000 blocks (prime time) [1] $ 0.30/1000 blocks (otherwise)
CTC	Connect Time Charge	$ 2.00/hour (prime time) [1] $ 1.20/hour (otherwise)

[1] Prime Time is Monday to Friday from 08:00 to 19:00 hours excluding holidays. **The highest rate applicable during any part of a session will be the rate used to charge for the entire session.** Nonprime time rates are 60% of prime time.

Non-session Charges

Online Storage	Online disk space. One block is 128, 36-bit words (640 characters)	$ 1.00/1000 blocks/day
Offline Storage	Customer supplied tape (one month minimum charge)	$ 2.00/tape/month
	UTCS rented tape (one month minimum charge)	$ 2.50/tape/month
PDC	Peripheral Device Charge. Use of DECsystem-1090 tape drive	$ 2.00/tape mount + $ 5.00/elapsed hour
IPRINT	Printing done on the IBM 3033/N12 by the IPRINT utility.	
	line (impact) printer	$ 0.10 x SF [2]/page [3]
	laser (xerographic) printer	$ 0.023 x SF [2]/page [3]
	line (impact) printer forms mount charge	$3.25/mount [3]
	laser printer forms mount charge	$2.00/mount [3]

[2] A customer's choice of Priority affects job turnaround. Priority 6 jobs (SF=1) generally execute after Priority 8 jobs (SF=2).

[3] See Appendices A and C for available paper forms on impact and laser printers.

General Purpose UNIX Service

Session Charges

Charging Algorithm	CPU + CTC + PDC	
CPU	Charge for use of the central processing unit (CPU)	$ 2.00/CPU-min (prime time) [4] $ 1.333/CPU-min (otherwise)
CTC	Connect Time Charge	$ 1.50/hour (prime time) [4] $ 1.00/hour (otherwise)
PDC	Peripheral Device Charge. Use of the tape drive	$ 2.00/mount + $ 5.00/elapsed hour

[4] Prime Time is Monday to Friday from 08:00 to 19:00 hours excluding holidays. **The highest rate applicable during any part of a session will be the rate used to charge for the entire session.** Nonprime time rates are two-thirds of prime time.

Non-session Charges

Online Storage	One block consists of 1024 characters	$ 1.00/1000 blocks/day
Offline Storage	Customer supplied tape (one month minimum charge)	$ 2.00/tape/month
	UTCS rented tape (one month minimum charge)	$ 2.50/tape/month
Line Printer	Use of the locally connected line printer	$ 0.15/page
ipr	Printing done on the IBM 3033/N12 by the ipr utility	$ 0.10/page impact printer [5] $ 0.023/page laser printer [5]
PDC	Peripheral Device Charge. Use of the tape drive	$ 2.00/mount + $ 5.00/elapsed hour

[5] See Appendices A and C for available paper forms on the impact and laser printers.

UNIVERSITY OF TORONTO COMPUTING SERVICES INTERNAL RATE SCHEDULE

Effective July 1, 1984 (UTCS reserves the right to change rates without notice)

SERVICE	DEFINITION	CHARGES
OTHER SERVICES		
DATAPAC	Use of the DATAPAC facility	$12.00/connect hour
	NOTE: Customers contemplating using DATAPAC into UTCS should contact a Marketing Representative for further details.	
Mainframe File Transfer Facility	Connect time charge	$ 4.50/hour
File Transfer Services	Connect time charge	$ 2.50/hour (prime time) [3] $ 1.50/hour (otherwise)
Plotting	GOULD electrostatic plotter	($ 2.70 x SF [1])/metre
	CALCOMP 1051, 4-colour, pen plotter	($52.00 x SF [1])/plotter-hour [2] ($ 1.00 x SF [1])/metre [2]
	NOTE: Output destined for plotting can be generated from several UTCS systems. However, because the Gould and CALCOMP plotters are attached to the IBM, customers must have an account on the IBM system.	
	[1] A customer's choice of Priority affects job turnaround. Priority 6 jobs (SF=1) generally execute after Priority 8 jobs (SF=2).	
	[2] This rate applies when the CALCOMP is mounted with the default pens and paper (form C112). Appendix B gives rates for other paper and pens.	
	[3] Prime Time is Monday to Friday from 08:00 to 19:00 hours excluding holidays. **The highest rate applicable during any part of a session will be the rate used to charge for the entire session.**	
Typesetting	Use of the C.A.T. phototypesetter	$ 0.60/inch
	Use of the Varian (electrostatic) typesetting simulator	$ 0.20/inch
	NOTE: The C.A.T. phototypesetter and the Varian typesetting simulator are both attached to the machine which provides the General Purpose UNIX Service. Typesetting output generated on the DECSystem-1090 can be transferred to the General Purpose UNIX machine for processing.	
Other Services	Tape cleaning; a double pass (forward and reverse)	$ 2.00/tape
	Job Handling	$20.00/hour
	Bursting	$20.00/hour
	Collating	$20.00/hour
	Paper Drilling	$20.00/hour
TERMINAL RENTAL		
	UTCS has several types of terminals for rent. The rental charge includes maintenance and acoustic coupler. There are minor additional installation and communications costs for limited distance, high speed modems. More information on installation costs is available from a UTCS Marketing Representative. All terminals have a one month minimum rental charge. UTCS also charges for pick-up and delivery unless the user chooses to do it.	
Video	Cybernex (APL100), DEC (VT100), Lanpar (XT100), Datamedia (Elite 1520)	$ 80/month
	Volker Craig (VC303, VC404), DEC (VT50, VT52), Soroc (IQ120)	$ 50/month
Hardcopy	Letter quality - Xerox (Diablo 1620, 1641) [4], CDI (1030, 1050)	$125/month
	Dot matrix - Decwriter II (LA36)	$105/month
	[4] Forms tractor attachment for these terminals is $10/month.	
PUBLICATIONS		
	UTCS stocks a variety of manuals and other documentation which can be purchased by customers. Contact the UTCS Information Office for current prices.	

APPENDIX A

Rates for Special Forms Paper on Impact Line Printers

The rates for paper consumption at a UTCS special forms (impact) printer are given below. The first column gives the last two digits of the forms code. The second and third columns describe the form. All paper sizes are in inches and are in the format (length x width). The fourth column is the cost **per page**. The job page count is the **greater** of; the number of lines in the job divided by 60, or; the number of skip-to-top-of-page commands issued by the job. Further information on UTCS forms codes can be found in the UTCS Guide to Highspeed Printing. Customers who have special requirements (e.g., pre-printed forms or unusual forms control) should contact UTCS Operations. With the exception of forms codes 30 and 31, all printing done on the forms listed below incurs a $3.25/job forms mount charge.

Table 1: Rates for Special Forms in Impact Printers

Forms Code (last 2 digits)	**Description** size	type	**Price per Page**
00	11 x 15	1 part, lined	$0.110
01	11 x 15	1 part, blank	$0.110
02	11 x 15	2 part	$0.126
03	11 x 15	3 part	$0.139
04	11 x 15	4 part	$0.156
05	1 7/16 x 4	labels (1 across)	$0.018
06	15/16 x 3.5	labels (3 across)	$0.019
07	1 7/16 x 4	labels (3 across)	$0.029
08,09	11 x 8.5	1 part, lined	$0.107
10,11	11 x 8.5	2 part	$0.117
12	11 x 8.5	3 part	$0.124
14	11 x 8.5	4 part	$0.136
16 to 18	11 x 9.5	1 part, blank	$0.111
20 to 23	11 x 9.5	1 part, blank	$0.111
30,31 [1]	8.5 x 15	1 part	$0.100
32	8.5 x 15	2 part	$0.121
33	8.5 x 15	3 part	$0.132
34	8.5 x 15	4 part	$0.145
35	8.5 x 15	1 part, blank	$0.108
9000		user supplied forms	$0.040

[1] Forms codes 30 and 31 request default paper. If these forms are specifically coded, the forms mount charge will be applied.

APPENDIX B

CALCOMP 1051 Paper, Pens, and Rates

Papers and Pens (Forms)

The size and type of paper and the pens to be used are conveyed by means of form names. The form name, mwpi, is comprised of single letter or digit codes for the Machine type (m), Paper Width (w), Paper type (p) and Ink type (i) (see Table 1 below). The default form is C112. Details regarding the specification of forms can be found in the UTCS USERBOOK Section 3.8PLOTBASIC and 3.8PLOTBASIC SUBTEXT.

Where special paper and/or pens are required, special arrangements must be made with Operations before the jobs are submitted with the appropiate special form names (i.e. those with X's in them). The special papers and pens are supplied by the customer and extra charges for the manual handling of these jobs may be levied by Operations.

Charging Rates

A Calcomp plot will be charged by; 1) the elapsed time on the plotter, 2) the length of plot, 3) a setup charge for any request other than forms C111 and C112, and 4) the Service Factor of the job which produces the plot.

The rates are given in Table 2 below. The Service Factor affects the plotting cost. Priority 6 has a Service Factor of 1 (the default) while Priority 8 has a Service Factor of 2. Priority 8 jobs cost twice as much as Priority 6 jobs.

Table 1: Codes for Form Names

Machine type (m)	Paper Width (w)	Paper type (p)	Ink type (i)
C (Calcomp)	1 (11" wide) 2 (34" wide) X (special type)	1 (translucent) 2 (vellum) X (special type)	1 (pressurized ball) 2 (liquid ball)

Table 2: Calcomp 1051 Rates

Description [2]	Form [1] name	Paper charge ($/metre) [3]	Elapsed time ($/hour) [3]	Set up ($)
11" Trans. PB.	C111	1.00	40.00	NA
11" Trans. LB.	C112	1.00	52.00	NA
11" Vellum PB.	C121	2.00	40.00	3.25
11" Vellum LB.	C122	2.00	52.00	3.25
34" Trans. PB.	C211	2.00	40.00	3.25
34" Trans. LB.	C212	2.00	52.00	3.25
34" Vellum PB.	C221	4.00	40.00	3.25
34" Vellum LB.	C222	4.00	52.00	3.25
11" Trans. SPen.	C11X	1.00	52.00	3.25
11" Vellum SPen.	C12X	2.00	52.00	3.25
11" SPaper. SPen.	C1XX	NA	52.00	3.25
11" SPaper. PB.	C1X1	NA	40.00	3.25
11" SPaper. LB.	C1X2	NA	52.00	3.25
34" Trans. SPen.	C11X	2.00	52.00	3.25
34" Vellum SPen.	C12X	4.00	52.00	3.25
34" SPaper. SPen.	C1XX	NA	52.00	3.25
34" SPaper. PB.	C1X1	NA	40.00	3.25
34" SPaper. LB.	C1X2	NA	52.00	3.25

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[1] C112 is the default.

[2] Trans. - Translucent Paper
PB. - Pressurized Ball point pens
LB. - Liquid Ball point pens
SPen. - Special customer-supplied pens
SPaper. - Special customer-supplied paper
NA - Not Applicable

[3] These rates are affected by the Service Factor (i.e., the Priority of the job that generates the plot). See explanatory notes in the above text.

APPENDIX C

Rates for the Laser (Xerographic) Printer

The default characteristics of output directed to the laser printer are; duplex; individual sheets of 8.5 x 11 inch paper without 3-holes punched in it; portrait orientation; TN modified character set; a 0.5 inch left margin, and; two-up paging (see the text below for a discussion of some of the above terms). Jobs which request special user-supplied paper forms or paper forms other than paper forms codes **N, Y** or **B** (see the Table below) are charged a forms mount charge of $2.00/job.

In the discussion that follows, a virtual page is the material printed on a single page -- in the old line printer sense. The job page count is the **greater** of; the number of lines in the job divided by 60, or; the number of skip-to-top-of-form commands issued by the job.

When one virtual page is printed per laser printer page, this is referred to as one-up printing. When two virtual pages are printed on a single page, this is called two-up printing. Simplex means single sided printing while duplex means double sided printing. Landscape orientation means the line is printed parallel to the longest edge of the paper. Portrait orientation has the printed line parallel to the shortest paper edge.

A four character code, IJKL, is used to specify the paper type (I), layout or orientation (J), character set (K), and left margin (L). A complete discussion on laser printer forms can be found in the UTCS Guide to Highspeed Printing. The specification of the I and J parameters affect the virtual page charge. The Table below gives the charge/virtual page of all the currently available combinations.

Virtual Page Prices on the Laser Printer

Paper (I) [1]	Layout (J) [2]	$/virtual page	Mount charge per job
N	A	$0.050	$0.00
N	B	$0.050	$0.00
N	C	$0.025	$0.00
Y	A	$0.045	$0.00
Y	B	$0.045	$0.00
Y	C	$0.023	$0.00
B	A	$0.045	$0.00
B	B	$0.045	$0.00
B	C	$0.023	$0.00
O	A	$0.050	$2.00
O	B	$0.050	$2.00
O	C	$0.025	$2.00
D	A	$0.045	$2.00
D	B	$0.045	$2.00
D	C	$0.023	$2.00

[1] N - no holes, simplex
Y - no holes, duplex (default paper)
B - no holes, duplex (default paper)
(0.25 inch binding margin added)
O - three holes, simplex
D - three holes, duplex

[2] A - landscape, 1-up
B - portrait, 1-up
C - portrait, 2-up (default layout)

UTCS Microcomputer Support Group

Software Discounts

UTCS now offers three software packages at discounted prices: The FinalWord, SPSS/PC, and PC-PLOT-III. In each case, UTCS has negotiated with the distributor for significant quantity discounts, which we are passing on to our users. Details of each are described below.

- **The FinalWord:** This is a **word processing** package produced by Mark of the Unicorn of Cambridge, Massachusetts and distributed at UTCS for the past year. Normally it sells for $300.00 (US) but is available from UTCS for $195.00 (CAN), a significant saving.

  One important advantage it has over other packages is that it is compatible with SCRIBE on the DECsystem-10, thus making it relatively easy to access the Xerox 8700 laser printer for high quality printing. For example, one can edit a document on a micro, upload it to the DECsystem-10, and run SCRIBE, with little or no editing of the document on the DECsystem-10. As The FinalWord is itself a subset of SCRIBE, in terms of its formatting capabilities, the output from SCRIBE will generally match that of The FinalWord on a micro. After running SCRIBE, one can use IPRINT to print on the laser printer, producing any number of copies easily.

  The FinalWord is available for most MS/DOS machines, particularly the IBM PC. UTCS tries to keep a small quantity on hand for immediate distribution, so that long delivery delays can be eliminated.

- **PC-PLOT-III:** This package normally retails for $95.00 (US) but is now available from UTCS for $100.00 (CAN), approximately a 30% saving. As discussed in previous *COMPUTERNEWS* articles, PC-PLOT-III, from MicroPlot Systems of Columbus, Ohio, allows Tektronix 4010 terminal emulation for graphics and VT100 emulation for communications. It would be useful for anyone using an IBM PC or compatible (Olivetti, Columbia, Eagle) as a graphics terminal, while signed on to interactive SAS on TSO, for example. It is also excellent simply as a VT100 emulation program for nongraphics work. (Unfortunately, as it's designed for graphics, it will not work on an IBM PC with the standard IBM monochrome adapter card. It will work with other expansion cards and with most PC-compatibles, however).

  UTCS will endeavour to keep a small supply of PC-PLOT-III available, so that users may obtain a copy quickly and easily.

- **SPSS/PC:** Normally retailing for $795.00 (US), this statistical product is offered at UTCS for $570.00 (US) or $760.00 (CAN). SPSS/PC is the micro version of the popular SPSS or SPSSX now running on the IBM mainframe under MVS. It is large for a micro, however, and requires a hard disk. It now runs on the IBM PC/XT and compatibles, and a version for the IBM Personal Computer AT should be available in November or December. (See the article "SPSS on the IBM PC/XT" elsewhere in this issue for further details.)

For more information on these products, or to order your copy, please call us at 978-8701.

User Group News

Recently, representatives from the three main micro user groups on campus (Apple, CP/M, and IBM PC & Compatibles) met with representatives from UTCS, the Committee on Academic Computing, and the Office of the Vice President, Research and Government Relations. Under discussion

continued...

Microcomputer continued

was the possiblility of user group participation in the University's planning process for micro-related issues. Subject to full approval by the parties concerned, it was agreed that a member of the joint executive of the three user groups will sit on the Committee on Academic Computing. The user groups' delegate, representing over 400 users, would thus participate in both strategic and budgetary planning for the long and short-term future at U of T. This would benefit the University as a whole, since we can expect a more standardized plan to evolve in the microcomputer area, with the elimination, hopefully, of competing requirements based on differences in micro manufacturers. UTCS particularly would benefit since user needs and priorities would be communicated collectively; at present, our perception of these is based largely on individual requests and queries.

In related matters, the Campus Bulletin Board system has still not begun, but hopefully this will be resolved in the near future. User Group meetings have been held already this fall; the initial kick-off to the season was a well-attended joint meeting of the three groups, with "Robotics" as the theme for the evening. The IBM PC [and compatibles] Users Group will be meeting on the fourth Tuesday of each month; they are forming subsidiary Special Interest Groups as well. The Apple Users Club has been meeting regularly, with the possibility of forming a Macintosh subgroup under discussion. The CP/M Users Group will be meeting again on November 26.

Other News:

- **IBM PCs** are now available at substantial discounts. This includes the IBM PC, PC/XT, Personal Computer AT, and the Portable PC. **Personal** purchases may be made from the Bookstore, which has negotiated with a local PC dealership to sell these machines on campus. The Bookstore is also an official IBM dealership for the IBM PC Jr. For **institutional** purposes, i.e., for academic teaching/research and for administrative users, the University has concluded an agreement with CROWNTEK as the major prime vendor, on a nonexclusive basis, for the purchase of IBM micros (excepting the PC Jr). This means that, for institutional purchases, the Purchasing Department will deal with this vendor only, except under extraordinary circumstances or by special request. Further announcements will be made in the near future. In any case, please call us at 978-8701 for details and advice.

- **Copyright Protection** is becoming a serious issue at U of T. Some users are trading or copying software illegally, which could give the University a bad reputation with software vendors, The discounts that have already been arranged, and future discounts as well, could be jeopardized if users insist on ignoring copyrights. Please, for everyone's sake, honour the copyrights on software products.

Paul Roth

DECsystem-10 News

On behalf of the DECsystem-10 support group I would like to issue a belated "welcome back" to all new and returning users. Those who have used a DECsystem-10 at UTCS or another installation will no doubt be interested in some recent changes and future plans. These are described later in the article.

If you are a new or potential user, the following overview will be of interest.

DECsystem-10 Overview

The DECsystem-10 is a general purpose timesharing computer system manufactured by Digital Equipment Corporation. DECsystem-10 timesharing takes maximum

continued...

DECsystem-10 News continued

advantage of the capabilities of the computer by allowing many independent users to share the facilities of the system simultaneously. In this way, each user interacts with the system as if s/he were its only user. The TOPS-10 operating system provides users with a powerful command language and a flexible, easy-to-manipulate file system. In addition, a full range of working software is available to every user.

The memory consists of 1024 pages, or 512K 36-bit words. In addition, the five disk drives on the system provide a total of almost 200 million words of mass storage. Users may access the system through one of its 80 terminal interfaces. There is also a highspeed communications link to the IBM 3033/N12.

The TOPS-10 Command Control Language consists of over 100 simple statements by which the timesharing user communicates with the operating system to control the running of his/her task or job. In fact, all activity on the system begins with commands entered by users at their terminals. In many cases the user can omit command parameters and the operating system will supply reasonable default values. As a result, the Command Control Language, although extensive, is easy to learn and use.

The same Command Control Language is also used when submitting a job to the GALAXY Batch system, if the user prefers not to execute it interactively. The control statements for DECsystem-10 Batch are identical to those used by an interactive user, except that several special Batch-only commands exist which allow the user to modify the flow of control should an error occur.

There is also a "terminal Batch" facility called MIC (for Monitor Interpretive Commands) which allows users to execute their own predefined command sequences. In addition, a simple command allows users to submit jobs to the UTCS IBM 3033/N12 Batch stream and to retrieve the resulting output, all while remaining connected to the DECsystem-10.

The most important resource controlled by TOPS-10 is the file system. All disk data is organized into groups of 128-word blocks called files. The user specifies a name for each file, but need not be concerned with such details as preallocating space, obtaining retrieval information or maintaining an appropriate level of security for his files. Rather, the operating system dynamically performs all the bookkeeping necessary to manage files.

UTCS has many enthusiastic users of the DECsystem-10. Neophytes and experts alike find it a useful tool in their work because of its ease of use, fast response and forgiving nature in the event of user errors.

Tops-10 Version 7.02 Installed

The big news during the summer was the installation of the latest release of TOPS-10, Digital's operating system for the DECsystem-10. This upgrade was transparent to most users, although there were significant performance improvements.

Digital's major reason for Version 7.02 is to support fully the corporate networking protocol DECnet-10 phase III. For the time being at least, this functionality is of no use at UTCS. However, 7.02 contains many performance enhancements and a number of new features intended to further the system's "user friendly" reputation. For an account of these, see "TOPS-10 Version 7.02 Is Here" in the July/August issue of *COMPUTERNEWS.*

DECsystem-10 Security

TOPS-10, the DECsystem-10's operating system, is known for being extremely secure. The system implements several

continued...

DECsystem-10 News continued

techniques for preventing unauthorized access of the system or its files.

The weakest link in the security of any computer system is the fact that much of it depends on the use of passwords. For example, not long ago there were two instances of illegal use of DECsystem-10 accounts. In both cases the password had been guessed by the unauthorized user because the owner of the PPN used his login name as the password. Account owners should remember that they bear full responsibility for security violations caused by failing to maintain a secure password. UTCS strongly recommends that passwords be selected with security uppermost in mind.

In this context two new features have been added to the LOGIN program:

1. The system will report the date and time of the user's previous login.
2. Users modifying their own passwords will have to specify exactly six characters.

Built into the file system is both a general purpose access protection scheme and a method which allows users to grant or deny specific levels of file access to individual users.

There are times, however, when even more security may be called for. Special measures may be appropriate, for example, when data is being transported to another computer site or if it is so sensitive that it must be protected even from the computer operations staff. An example of such a file encryption program is CRYPT. Interested users should read the CRYPT help file.

DECsystem-10 Noncredit Short Courses

UTCS offers several short courses which may be of special interest to DECsystem-10 users. The courses are listed below together with the names of the online documentation files which describe them.

Course	**Description**
Novice Users	DOC:NOVICE.CRS
Advanced Users	DOC:ADVANC.CRS
Assembler Language	DOC:ASSEM.CRS

For further information and course registration, call Irene Rosiecki at 978-4565.

Dr. Edmund West

SCRIBE: Prescriptions for Large Document Preparation

Using SCRIBE to prepare small documents such as letters, short articles or small reports is usually easy, because SCRIBE has predefined document types that handle all of the general formatting details for you. For example, the document type "letter" allows you to identify specific sections, such as the inside address or the salutation, with commands like "@address" or "@greeting". Other document types have sectioning commands especially suited to them.

Document types such as "report," "manual" or "thesis" have more sectioning commands than "text" or "article," reflecting their greater complexity. These documents also tend to contain much more text than their simpler counterparts. Large amounts of text present certain difficulties in document formatting, regardless of the type of document or the skill of the user. Some common difficulties are:

1. Reformatting 300 pages because of a spelling error in the second chapter.
2. Misspelling a cross reference label and not knowing which label was misspelled.
3. Printing 175 pages and finding that the format is incorrect.

continued...

SCRIBE continued

You can eliminate these difficulties and produce large documents much more easily by using some SCRIBE facilities especially designed for large document production. While most useful to experienced SCRIBE users, they can be mastered quickly by novice users. This article discusses these facilities in detail and is intended for those already using SCRIBE. If you wish to know more about SCRIBE itself, contact Pat Hood at 978-4548.

Large documents can be divided into small, logical pieces which are easier to manage, and which can be formatted separately. The **@part** command in SCRIBE is used to link individual parts with the whole. The typical organization of a document which takes advantage of the @part command would look like this:

```
chap1.mss
chap2.mss
chap3.mss
```

Each chapter or section of the document is placed in a separate file. The first line of each of these files would be the @part command, and the text would follow.

```
@part(Chapter1, root "Thesis.mss")
@chapter[Producing Large Documents]

Producing large documents with a ...
```

This @part command consists of two parts: "Chapter1", which is the name of the part of the document contained in the file; and "thesis.mss", which is the root file of the document. The **root** file, thesis.mss, is often referred to as the **master** file for the document. This file contains the @make and the @style commands which determine the format of the entire document. All of the chapters are embedded in the master file using the @include command. To extend our example, the master file would like this:

```
@make(thesis)
@style(spacing 2.25 lines, references APA,
        linewidth 60 chars)
@include(chap1.mss)
@include(chap2.mss)
@include(chap3.mss)
```

To produce the entire formatted document, the file "thesis.mss" is processed through SCRIBE. To format an individual chapter, the master file must be formatted once and then any part can be formatted by itself. When the master file is run through SCRIBE, two special files are created: an **.aux** file and an **.otl** file. **thesis.aux** is called the auxiliary file for the document. This file contains all the details about the kind of document "thesis.mss" produces. Page numbers, chapter titles and numbers, section titles and numbers, and numbers of figures and tables are all recorded in the auxiliary file. With an auxiliary file for a document, you can format any one part of the document and have it look exactly as if it had been formatted as part of the whole. If you run **chap2.mss** through SCRIBE, the @part command informs SCRIBE that it must use the information in thesis.aux in order to format chap2.mss correctly. Thus, a spelling error in Chapter Two doesn't mean that the entire thesis must be reformatted. The part containing Chapter Two can be corrected and reformatted by itself. The SCRIBE users' manual provides other examples of the @part command.

The second special file that is created when you process a file through SCRIBE, is the outline or .otl file. This file contains valuable information much like the auxiliary file. A printout of the outline file, **thesis.otl,** would look like this:

```
1. Producing Large Documents   1    chap1.mss    00200/1
 1.1 Tips for Beginners        1    chap1.mss    05000/1
2. Using the @Part Command     5    chap2.mss    00200/1
 2.1 The .aux File             8    chap2.mss    01500/1
 2.2 The .otl File            11    chap2.mss    03000/1
3. Cost Efficient Processing  15    chap3.mss    00200/1
 3.1 Night Processing         17    chap3.mss    01800/1
 3.2 Plain Processing         20    chap3.mss    05000/1
  3.2.1 Part Processing       25    chap3.mss    07600/1
```

continued...

SCRIBE continued

```
        Alphabetic Listing of Cross-Reference Tags and Labels
Tag or Label Name      Page     Label Value     Source File

--------------------------------------------------------------------


BigDocument             1       1               chap1.mss 00300/1
ChapterOne              1       1.1             chap1.mss 00500/1
Outline                11       2.2             chap2.mss 03100/1
Night                  17       3.1             chap3.mss 01900/1
Plain                  20       3.2             chap3.mss 07600/1

Undefined Label First Reference

--------------------------------------------------------------------
Plane                           (chap3.mss 08100/1)
```

The outline file obviously provides you with an outline of the thesis, including the chapter numbers and title, and the section numbers and titles. The outline also gives you the page number, the name of the source file, and the line number in the source file where each new chapter or section begins. Any tags or labels used for cross-referencing are listed along with the value of the label, the page in the document where it appears and its location in the source file. In our example, the listing of undefined labels shows that one undefined label was referenced. This outline file could be used to pinpoint a misspelled label which causes table numbers to be incorrect. You could also see that section "3.2.1 Part Processing" is what you intended section 3.3 to be, and you could correct the sectioning command. Other examples of the outline file can be found in the SCRIBE users' manual.

Many of the difficulties associated with producing large documents arise when the document is printed. If you forget to close an environment or command, SCRIBE usually tells you about it. If however, there is an extra delimiter or an extra @end command in your document, you may not find the problem until you print your formatted document.

When printing your document for the first time, you should print a short sample to make sure that the character set, line width, margins, and other general details are correct. If you use any special characters in your document, you should include them in your sample file to make sure that they print correctly. You receive significant savings using the 8700 laser printer instead of the line printer, but 10 pages of incorrect output is certainly more desireable than 300 pages of the same.

Producing large documents using text formatting packages can be a difficult, time-consuming process. SCRIBE, however, has the tools to make large document production less time-consuming, and less painful.

Patricia Hood

Expanding Horizons: SCRIBE and MLA Style

Modifications are being made to the SCRIBE text formatting package that will allow bibliographies to be formatted according to the Modern Language Association (MLA) style. These modifications are part of a larger project to create an MLA thesis document type in SCRIBE. When all of the modifications are complete, SCRIBE users will be able to produce theses conforming to MLA style for format, citations, and bibliography entries. These facilities will be described in a document tentatively titled: "Thesis Preparation using MLA Style and SCRIBE."

Bibliography preparation is an exacting task. SCRIBE provides a consistent system for entering bibliographic information. The current bibliography output formats, however, are oriented toward technical and scientific theses. These new developments using MLA style will provide a thesis and bibliography format better suited to Humanists.

If you are interested in providing input for this project, or if you would like more information, please contact Pat Hood at 978-4548.

Patricia Hood

9700 Service Discontinued

The 9700 Printing Service has been discontinued as of October 1, 1984. It has been replaced completely by the 8700 laser printer and the 8700 Document Printing Service. 9700 users who have not converted to the 8700 laser printer will find it easy to do so, and should contact Pat Hood at 978-4548 for more information. They should also see the UTCS Guide to Highspeed Printing which explains how to use the 8700 laser printer.

Patricia Hood

Out of the JCL, into the Shell

In a book review in *COMPUTERNEWS* No. 206, I wrote:

> "Frustrated by JCL?...
> Bogged down in data conversions?
> Imagine how easy life would be
> if all the programs that you had
> to use ... worked together rather than
> getting in each others' way! ...
> If this all seems like 'pie in the sky,'
> you probably have been using a system
> that makes your life difficult and makes you
> cynical about the possibility of such an
> environment..."

Of course such environments do exist. One such environment is the UNIX timesharing system, and UTCS is now offering UNIX timesharing on a regular basis.

Volumes have been written about UNIX over the last few years. But two things that give the system special appeal are the consistency of its notation and the wide range of tools that work together. Consistency in naming conventions is important if a system is to be easy to use. For example, TSO uses one set of special characters (i.e., *.pli) for specifying subsets of files to its commands, but uses a different set of characters for picking the same names of files out of a text file. UNIX, by contrast, uses a similar notation for both operations. Since users of a timesharing system must do these operations frequently, it's valuable to have them use the same or similar notation.

The wide range of programs provided with UNIX includes text editors, formatters for character devices and typesetters, compilers for several popular languages, a simple electronic mail facility, and a range of software tools. Each of these tools does one operation (such as sorting a file, comparing two versions of a file, counting the words, lines and characters in a file) and gets it right with no danger of interaction with other operations. Such programs can with equal ease handle normal prose text, computer programs, and data. There are few assumptions about the input format, so that little time is lost in file conversions necessary on other systems.

How do new people learn about UNIX? For text processing applications, we offer the course TXT103, UNIX for Beginners. This course is offered periodically, most recently, in October, 1984. Please contact the Educational Services Support Specialist, Irene Rosiecki, at 978-4565 to schedule a place in the next introductory course.

continued...

Out of the JCL continued

For programmers, the traditional route to learning UNIX has been to sit down with a UNIX manual and a terminal, and work through the manual. More recently, textbooks have offered an easier route. The best of the textbooks for programmers is *The UNIX Programming Environment* by Brian Kernighan and Rob Pike (Prentice-Hall, 1984, 0-13-937681-X, 357pp including index). This book is carried from time to time by the U of T Computer Store (part of the Textbook Store), and various off-campus computer shops. It may also be ordered through the UTCS Information Office.

If there appears to be enough demand, we could offer a Programmer's Course in UNIX. Please contact either Irene Rosiecki or Ian Darwin if you are interested either in taking a course yourself or in sending programmers who work for you.

So if you are frustrated by JCL and bogged down by data conversion, learn about UNIX, open an account on our new GP UNIX service, and start making your computing faster and easier.

Ian Darwin

New DOCUMENT Command on TSO

The DOCUMENT command is used to access UTCS documentation from TSO. Recently a new version was installed. Although it can be used in the same way as the old version, users may be interested in some new features that are now available.

The old DOCUMENT command only printed the requested documents on a highspeed printer. The new one also permits you to view the requested document at the terminal. For example, to view the TSO Guide, type:

```
document   tsogd   browse
```

If you have accessed TSO in fullscreen mode (via PACX Class 33 for example), then ISPF/BROWSE is used to view the document. Otherwise TSO/EDIT is used.

Another new feature is support for the Xerox 8700 laser printer. If you use a laser forms code that supports bold and italics, such as YXLE, the DOCUMENT command will automatically do the necessary processing for bold and italics. Although the output produced is more expensive than that from the default forms code, YXLE is the recommended code for printing UTCS documents in the most useful and intelligible format.

Also new is the ability to find the history of a document. For selected documents that are frequently updated, the Publications Group produces a list of changes; the list is accessible through the "history" keyword of the DOCUMENT command. By looking at this history list, you can see what changes have occurred in the system and then decide whether you want to obtain another copy of the document or just update your existing copy by hand.

New users generally find out which documents they need from the UTCS Catalogue: Access. Continuing users sometimes are interested in seeing a complete list of what is available. For the latter we have added a new document called INDEX. To view this at your terminal, type:

```
document   index   browse
```

We hope that the new version of TSO DOCUMENT will make it easier for our users to obtain the information they need. For more information, please type "help document".

Alex Nishri

Saving Pages with SAS®

Since the recent change in printing charges, many people have commented that SAS uses too many pages when it prints output for procedures such as ANOVA and GLM. As a result, the low lines per page ratio can mean a large, expensive listing. Many SPSS users know that, to have your output printed continuously without skipping to a new page, you can use the PAGESIZE control card with NOEJECT in the specification field. SPSS-X has the SET command with the subcommand LENGTH=NONE to provide the same function. Unfortunately, SAS does not have a corresponding system option. In this article, two suggestions for saving pages with SAS will be presented. The first produces output similar to SPSS and SPSS-X; the second, SASCOMP, preserves more of the original layout.

In the majority of cases, trying to improve on the package output is not worth the trouble. There will always be additional processing costs with each job which reduce the savings. With the simpler techniques, page breaks may occur in the middle of tables or plots. With some of the compression techniques, there is a possibility that all of the output will be lost if the job abends in one of the final steps.

A sample program was written using PROC PRINTTO and a DATA step to show how it is possible to imitate SPSS and SPSS-X compressed output. This example is discussed below. It would be possible to make the simple compression "smarter" to customize it for personal use. For example, you could put the word PLOT in the title of PROC PLOT output, and always skip to a new page when it was found. For more examples of customized output, an excellent reference is the paper "Practical Applications of PROC PRINTTO" by Edward Barry & Amy Ko, in the 1982 SUGI Proceedings. An example of a sophisticated post-processor written by a user is the SASCOMP procedure, which was developed by Howard Kaplan of the Addiction Research Foundation. SASCOMP compares page headers before combining pages, which prevents plots and tables from being split between pages.

For a first test, we used a program with four DATA steps, a PROC ANOVA with MEANS, a PROC GLM, a PROC REG, a PROC PRINT, a PROC PLOT, and two PROC NLINs. The default run simply used the JCL "// EXEC SAS". The second run was identical, except NOGRAPHICS, NOMACRO and NOINCLUDE were set to reduce execution costs. For the third run, the same options were set and the compression step was added. SASCOMP was used for further comparison in the fourth run. Only two pages were saved with this example, but the output remained very well laid out. Please note that all of the jobs in this test and the one that follows were printed on the Xerox 8700 with the default forms. This is currently the cheapest way that UTCS offers printing; use of any other forms will be more expensive.

Big Test

RUN	EXEC	PRINTING	TOTAL	
1) Default run	$1.05	$0.71	$1.76	(26 pages)
2) With options off	$0.95	$0.71	$1.66	(26 pages)
3) With compression	$1.10	$0.48	$1.58	(15 pages)
4) With SASCOMP	$1.06	$0.67	$1.73	(24 pages)

In this table and the one below, the right-hand column gives the number of pages of procedural output. The PRINTING column gives the total cost of printing, which includes the cost of additional pages (five for these programs) required for the SAS log and the job log.

A second test was done with a smaller program to illustrate some more considerations. This program consisted of just two DATA steps, one ANOVA with MEANS and a PROC GLM. The three runs were set up in the same way as for the first test.

continued...

SAS® continued

This time, however, the results were different. With the compression step, the printing cost was lowered, because there were only three pages of procedural output instead of six, but the execution cost rose by an equal amount. The extra step did not gain us anything, and it is possible to contruct examples where we would have lost money.

Small Test

RUN	EXEC	PRINTING	TOTAL	
1) Default run	$0.39	$0.25	$0.64	(6 pages)
2) With options off	$0.35	$0.25	$0.60	(6 pages)
3) With compression	$0.42	$0.18	$0.60	(3 pages)

Below is a copy of the program used to do the compression. The first statement is PROC PRINTTO, which puts all of the procedural output into a dataset. After all of the procedures are completed, the second PROC PRINTTO redirects the output back to the printer. The DATA step reads the original output, changing page breaks to three blank lines and removing many of the blank lines that might occur anywhere else. Placing this piece of code into a dataset and %INCLUDE might be useful - but be sure that you do not use NOINCLUDE in your JCL. While it may seem like a good application of the SAS macro language, in fact the extra overhead of using macros will significantly reduce any possible savings. This code should not be copied; rather, it should be used as a starting point for further work.

```
// EXEC SAS,OPTIONS='NOGRAPHICS,NOINCLUDE,NOMACRO'
//FT67F001 DD UNIT=VIO
//SYSIN DD *
PROC PRINTTO UNIT=67 NEW;
DATA BARLEY;
 :
PROC ANOVA;
 :
DATA PHYSICAL;
 :
PROC GLM;
 :
PROC PRINTTO;
DATA _NULL_;
 RETAIN FLAG 0;
 INFILE FT67F001 LENGTH=LEN;
 FILE PRINT NOTITLE;
 INPUT @;
 LEN=LEN-1 ;
 INPUT @1 CC $CHAR1. @2 TEXT $VARYING132. LEN;
 IF CC='1' THEN PUT //;
 ELSE IF TEXT=' ' THEN
  IF FLAG>= 1 THEN PUT /;
        ELSE FLAG=FLAG+1;
  ELSE FLAG=0;
 IF TEXT ^= ' ' THEN PUT TEXT $CHAR132.;
/*
//
```

These suggestions for reducing pages must be implemented by user written programs, and are not program products supported by UTCS. Advising Services can provide the same level of assistance as with any user written code.

Diane Mitchell

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SPSS/PC on the IBM PC/XT

UTCS has received its first copy of SPSS/PC. SPSS/PC is a version of SPSS-X that runs on the IBM PC/XT, (IBM's personal computer with the 10Mbyte hard disk) and some PC compatibles. SPSS Inc. is testing others, as well as working on a version for the PC/AT, IBM's new "bigger" machine.

The SNAC group at UTCS has been evaluating this product over the past two months. Bill Fehlner attended the SPSS User Group (ISSUE) Conference in mid-summer and talked with SPSS staff and representatives from SPSS/PC test sites regarding their experiences. In August,

continued...

SPSS on PC/XT continued

SPSS/PC was installed on the IBM PC/XT in the Micro Lab, with no difficulties. The SNAC group has been testing it since then.

SPSS/PC appears to be a good stand-alone product for statistics on a micro. It has a simple interface for the beginner (a six character command gets you started) but allows an experienced user many options for filenames and the working environment. A log of what you type in during a session is kept, and the log can be edited later to create macro-like commands. SPSS/PC can read and write ASCII files and this provides a mechanism for passing data to and from other packages such as dBASE-II. The error messages are clear and generally give an indication of how to recover from the mistake.

SPSS/PC contains most of the major features of SPSS-X, including such multivariate procedures as ANOVA, FACTOR, CLUSTER, and Non-Parametric statistics. The syntax is not identical to that of SPSS-X, which makes transporting source programs between the two systems time-consuming. A user familiar with SPSS-X or SPSS Release 9 should be able to adapt to the changes very quickly. You can save and later get system files with SPSS/PC. However, cases cannot be added to a system file, and system files cannot be merged. For many projects, this will mean recreating system files from raw data on a regular basis.

System files can be uploaded to the mainframe, using UTCS' standard KERMIT file transfer facility, and read in by SPSS-X. SPSS-X system files can be downloaded to the PC with a bit of extra work. Anyone wanting further information about SPSS/PC and file transfers is welcome to call the SNAC group at 978-STAT.

Included with the software is a set of demonstration programs. These are available in the UTCS Micro Lab. A copy of the manual is also available. UTCS is the agent on campus for purchases of SPSS/PC. You may be eligible to purchase SPSS/PC through UTCS for the equivalent of $570.00 (US) (Price subject to change by SPSS Inc. and exchange rates). This price represents a discount of approximately 30% on the single copy price. One week delivery time is anticipated. To order a copy, run the demo programs or look at the manual, please contact the Micro Support Group at 978-8701.

Some benchmarks have been run comparing the time required to run comparable programs with SPSS/PC and with SPSS-X. The results are summarized in the following table:

	small file	large file	X tabs 2-way	Reg
SPSS X elapsed	0.47 sec.	3.21 sec.	6.91 sec.	4.18 sec.
SPSS X SUB&FET	~2 min.	~2 min.	~2 min.	~2 min.
SPSS PC elapsed	<1 min.	~5 min.	~1.5 min.	~1.5 min.

The "SPSS-X elapsed" row gives times reported by SPSS-X on the 3033/N12. The "SPSS-X SUB&FET" row gives the time required to SUBMIT a Batch job through TSO and BROWSE the output. This is the time the user sees as response time; it depends on time of day and how busy the machine is. These tests were run during "regular hours." The "SPSS/PC elapsed" row is the time required to run the same jobs on the PC, using programs in files, and thus does not include typing time. These last two rows can be compared more or less directly.

The "small file" column contains times to build a system file of 10 variables and 12 cases. The "large file" column is for a similar job with 85 variables and 500 cases, LISTing 5 variables from the first 10 cases. The "X-tabs" column contains times needed to run a single 2-way crosstabs table on the large file with 10 categories in each variable. The "Reg" column is for a multi-

continued...

SPSS on PC/XT continued

ple linear regression involving 4 independent variables from the large file. These last two columns include reading the saved system file on SPSS-X, but not on SPSS/PC. On the PC, the "active" file was used, and the CROSSTABS and REGRESSION commands were entered on the keyboard. Reading the saved system file on SPSS/PC took about three minutes and is not included.

As can be seen from the table, times are comparable for the two processors if you consider response time. The time to create the large file from raw data is probably limited by disk input/output speed on the PC. SPSS/PC, however, can process its own "active" file fairly quickly and perform procedures in about the same time that would be required to SUBMIT and retrieve output from a remote job entry system such as TSO or WYLBUR. Entering procedure commands interactively, however, probably requires less time than it would take to use an editor to produce Batch input.

The output of the regressions was identical; some of the statistics generated with the crosstabs table differed in the last place printed. More details from this benchmark exercise are available by calling 978-STAT.

Dr. John Roth

COBOL upgrade at UTCS

UTCS has installed VS COBOL Release 2.4 for testing. This is a major upgrade to COBOL, and this processor contains a significant array of new features. Some of these are file and library facility enhancements, new data manipulation and program development tools, and an expanded source language capability. Please see the following IBM manuals for further information: *IBM OS/VS COBOL Compiler and Library General Information Manual* (GC28-6740-2) and the *IBM OS/VS COBOL Compiler and Library Programmer's Guide* (SC28-6483-2).

UTCS has created the following procedures to access the new compiler: COBN (Compile only), COBNLE (Compile and Link Edit only), COBNGO (Compile and Go) and COBNLEGO (Compile, Link Edit, and Go).

In addition, users of COBOL load modules should run their existing programs with the Release 2.4 execution time library SYS1.PPTEST.VSCLLIB as soon as possible and report any problems at once to Advising Services at 978-HELP. This is important since Release 2.4 will eventually become the only IBM supported COBOL processor.

Herb Kugel

Christmas and New Years Hours of Service

UNIVERSITY OF TORONTO COMPUTING SERVICES CHRISTMAS & NEW YEARS HOURS OF SERVICE										
	24 Mon.	25 Tues.	26 Wed.	27 Thurs.	28 Fri.	29 Sat.	30 Sun.	31 Mon.	1 Tues.	2 Wed.
BICS Service	X	X	X	X	X	X	X	X	X	N
IBM 3033/N12 Services	X	UO	UO	UO	UO	UO	UO	UO	UO	N
DECsystem-1090 Services	X	UO	UO	UO	UO	UO	UO	UO	UO	N
GP UNIX Service	X	UO	UO	UO	UO	UO	UO	UO	UO	N

Legend

X - service unavailable
N - normal hours of service
UO - unattended operation:

- for the IBM 3033/N12 computer, all services except GPJS Classes B and E (jobs requiring intervention), Calcomp and Gould plotting, and Xerox 8700 output are available

- for the DECsystem-1090 computer, all services except tape mounts are available

- for the GP UNIX service, all services except tape mounts, the Varian plotter, and the CAT phototypesetter are available

During the period of unattended operation the Arts and Science Terminal and the Education and Research Interactive Terminal Room, will be closed. It is planned to have the Engineering Annex Terminal open on a limited basis during the holiday period. Please check at this site for precise arrangements.

Users should note that this is a tentative schedule and may be altered via HOTNEWS and alert notices closer to the Christmas period.

UTCS Noncredit Short Courses

UTCS offers a number of short, noncredit courses on the use of various products and services that we support. These courses are available to students, faculty and staff of the University of Toronto, as well as to other users of our system. Complete course descriptions for these and other noncredit courses offered at UTCS are available at the Information Office, Engineering Annex, Room 206, and at the Accounting Services Office, McLennan Labs, Room 337.

All short courses are held in the UTCS Education Facility, Room 221, McLennan Physical Laboratories. Due to the limited seating capacity in the Education Facility, and the number of terminals available for our hands-on courses, registration is required for short courses.

Please note that we reserve the right to cancel courses, if registration is too low.

Anyone interested in taking any of these courses must register in person with:

Educational Services Support Specialist
Engineering Annex, Room 207
978-4565

A nonrefundable Administration Fee of $10 per course is due at the time of registration. It may be paid by cash, cheque or on a Customer Account Number (CAN).

(Anyone interested in credit courses should contact the Department of Computer Science at 978-6360).

The following courses are offered in November:

SAS101 - Introduction to SAS

DATE: November 12-16, 1984
TIME: 2:00-4:00 p.m.

SAS/GRA101 - Introduction to SAS/GRAPH

Date: November 22, 1984
Time: 2:00-5:00 p.m.

SCR102 - SCRIBE for Beginners

Date: November 19-21, 1984
Time: 9:30-12:30 p.m.

TXT103 - UNIX for Beginners

DATE: November 12-16, 1984
TIME: 9:30-12:30 p.m.

UTCS is pleased to announce a new course, SAS/TSO101. For a full description, see ‘‘New SAS/TSO Course’’ elsewhere in this issue.

Irene Rosiecki

Change Committee

Changes To The Academic IBM 3033/N12 System

1. New versions of REGISTER and SCRATCH were installed for use on September 19.
2. IBM PC Graphics has been installed for production on TSO as of August 10.
3. COBOL 2.4 VS was made available to users on September 9.

Changes To PACX

1. PACX Class 132 was renamed to Class 33 on August 22.
2. Autobaud capabilities were enabled for PACX Class 33 on the Series/1 on August 29.

continued...

Change Committee continued

3. 16 dial-in lines were transferred from 978-6200 to 978-3959 on August 23.
4. PACX Classes 10 and 12 were merged to Class 10 on September 12.

Changes to Other Systems and Services

1. TCP/IP was installed on the GP UNIX VAX on September 7. This will provide a mechanism for high performance file transfers between UNIX sites.
2. RJE support was reworked on the GP UNIX VAX on September 10. This will act as a replacement for DECNET at Scarborough.
3. Installation of a VAX-11/750 for the new GP UNIX service was completed on August 3.
4. A 1403 printer was removed from the old EUT site in the Engineering Annex on September 12.
5. The Xerox 8700 laser printer began production services on September 17.
6. Regular rates for Class E service have been reinstated as of September 16.
7. The Paradyne printer at the Victoria College site was replaced with a TTY40 printer from the St. Michael's site on September 13. St. Michael's received an SSI 600 lines per minutes printer on September 17.
8. EAT and AST terminals have been attached to the Terminal Server Network as of August 18. User documentation has been distributed to Advising Services as well as the EAT and AST sites.

Joan Coutts

New UTCS Documents

New UTCS Documents in hardcopy

UTCS GUIDE TO PRODUCTS AND SERVICES: Introduction
UTCS GUIDE TO PRODUCTS AND SERVICES: Basics
UTCS GUIDE TO PRODUCTS AND SERVICES: Accounting

Previously announced:

The SOS Workbook
UTCS Catalogue: Access, Part 1
UTCS Catalogue: Access, Part 2
UTCS Catalogue: Numerical Products
UTCS Catalogue: Storage
UTCS Catalogue: Text Products
UTCS Guide to Census Tapes
UTCS Guide to File Transfer Service
UTCS Guide to GP UNIX
UTCS Guide to Highspeed Printing
UTCS Guide to KERMIT
UTCS Guide to Mainframe File Transfer Facility
UTCS Guide to SCRIBE

New UTCS Guides online

UTCS Guide to Census Tapes (MANUAL=CENSUS)

Previously announced:

UTCS Guide to APL (MANUAL=APLGD)
UTCS Guide to APL XFR (MANUAL=APLXFR)
UTCS Guide to File Transfer Service (MANUAL=FTS)
UTCS Guide to GPJS (MANUAL=GPJSX)
UTCS Guide to Highspeed Printing without fonts (MANUAL=PRINT)
(on DECsystem-10, TY DOC:PRINT,DOC)
UTCS Guide to IBM MVS Online Storage (MANUAL=IBMDISK)
UTCS Guide to KERMIT (MANUAL=KERMIT)
UTCS Guide to Mainframe File Transfer Facility (MANUAL=MFTF)
UTCS Guide to Paper Tapes (MANUAL=PAPTAPE)
UTCS Guide to SCRIBE
(on DECsystem-10 only; TY DOC:SCRIBE.DOC. For printing instructions, see page 1 of document.)

continued...

New UTCS Documents continued

UTCS Guide to Series/1 Terminal Use (MANUAL=SERIES)

3270 Emulation:
UTCS Guide to
Cybernex APL100 and Volker Craig VC404 (MANUAL=CYBER)

DM1520	(MANUAL=DM1520)
Hardcopy Terminal	(MANUAL=HARDCOPY)
IBM 3101	(MANUAL=IBM3101)
SOROC IQ	(MANUAL=SOROC)
VT52	(MANUAL=VT52)
VT100	(MANUAL=VT100)

UTCS Guide to TFW.MAK in SCRIBE
(on DECsystem-10 only; TY DOC:TFW.DOC)
UTCS Guide to WYLBUR (MANUAL=WYLINTRO)

To print online documents, WYLBUR users type "do document?", TSO users type "help document", APL users type ")LOAD 1 UTCSGUIDE <CR> HELP".

Recent Acquisitions in the Computer Library

Advances in computers.
1984, vol. 23.

American Association for Artificial Intelligence
Proceedings of the 4th National Conference, Austin, Texas, Aug. 1984.
Los Altos, Calif., William Kaufman Inc., 1984

Bell, J.L. and Machover, M.
A course in mathematical logic.
Amsterdam, North-Holland, 1977.

Bennett, John et al, eds.
Visual display terminals: usability issues and health concerns.
Englewood Cliffs, N.J., Prentice-Hall, 1984.

Gecsei, Jan.
The architecture of videotex systems.
Englewood Cliffs, N.J., Prentice-Hall, 1983.

Hehner, Eric C.R.
The logic of programming.
Englewood Cliffs, N.J., Prentice-Hall International, 1984.

Hume, J.N.P. and Holt, R.C.
VAX Pascal.
Reston, Va., Reston Pub. Co., 1984.

IFIP International Conference on Computer Security, 2d, Toronto, Sept. 1984.
Computer security: a global challenge, ed. by J.H. Finch and E.G. Graham Dougall. (Preprints)
Amsterdam, North-Holland, 1984.

IFIP Working Conference on Formal Description of Programming Concepts-II, Garmisch-Partenkirchen, June 1982.
Formal description of programming concepts-II, ed. by D. Bjørner.
Amsterdam, North-Holland, 1983.

International Conference on Robot Vision and Sensory Controls, 3d, Cambridge, Mass., Nov. 1983.
Intelligent robots, ed. by D.P. Casasent and E.L. Hall.
Bellingham, Wash., SPIE, 1984.
2 pts. (SPIE vol. 449)

Kernighan, B.W. and Pike, R.
The UNIX programming environment.
Englewood Cliffs, N.J., Prentice-Hall, 1984.

Schmidt, J.W. and Brodie, M.L., eds.
Relational database systems: analysis and comparison.
Berlin, Springer-Verlag, 1983.

Shiva, Sajjan G.
Computer design and architecture.
Boston, Little, Brown and Co., 1985

continued...

Computer Library continued

Snook, Tod et al.
Report on programming language PLZ/SYS.
New York, Springer-Verlag, 1978.

Traub, J.F et al.
Information, uncertainty, complexity.
Reading, Mass., Addison-Wesley, 1983.

Turkle, Sherry.
The second self: computers and the human spirit.
New York, Simon and Schuster, 1984.

Wilensky, Robert,
LISPcraft.
New York, W.W. Norton, 1984.

Stephanie Johnston

Technical Reports Recently Received in the Computer Library

Bell Laboratories

Kaufman, Linda	A package of subroutines for solving systems of linear equations. Revised Jan. 1981. #106
Stroustrup, Bjarne	The C++ programming language - reference manual. Jan. 1984. #108.
Pavlidis, Theo	PED users manual. Feb 29, 1984. #110.

University of British Columbia

Woodham, R.J.	Photometric method for determining shape from shading. July 1984. #84-10.
Abramson, Harvey	Definite clause translation grammars and logical specification of data types as unambiguous context free grammars. Aug. 1984. #84-11.

University of Illinois

Gao, Chuanshan, et al	Load balancing algorithms in homogeneous distributed systems. June 30, 1984. #84-1168.

New York University, Courant Institute of Mathematical Sciences

Cole, R. & Yap, C.K.	Shape from probing. December 1983, R.R. #15.
Clark, D. & Hummel, R.	VSH user's guide: a Software environment for image processing. March 1984. R.R. #19.
Schwartz, J. & Sharir, M.	Some remarks on robot vision. April 1984. R.R. #25.

Stanford University

Ullman, J.D.	Implementation of logical query languages for databases. May 1984. #84-1000.
Brinkley, J.F.	Ultrasonic three-dimensional organ modelling. March 1984. #84-1001.
Goldschlager, L.M.	A computational theory of higher brain function. April 1984. #84-1004.
Gabriel, R. & McCarthy, J.	Queue-based multi-processing Lisp. June 1984. #84-1007.

continued...

Computer Library continued

Zurich, Eidgenossische Technische Hochschule

Hoppe, J.	Magnet, a local network for Lilith computers. November 1983. #57.
Wirth, N.	Schemes for multiprogramming and their implementation in Modula-2. June 1984. #59.

Stephanie Johnston

Consulting and Enquiries

Advising Supervisor	Terry Jones	MP345	4757
External Marketing Consultant	Ihor Prociuk	MP350	6875
Erindale College	Peter Wall	2035	828-5311
Scarborough College	William Barek	S626	284-3173

General Enquiries	Dale Wright	EA206	4990
Account & Access Code Enquiries (U of T)	Agatha Stevens	MP337	8703
Account & Access Code Enquiries (External)	Sylvia May	MP337	7148
Tape Library (Academic Services)	Stella Martin	MP368	7319
Tape Library (Administrative Services)	Miranda Fong	MP368	6693
U of T Computer Library	Stephanie Johnston	EA206	2987

Central Advising Office (Appointments)	HELP	300 Baud Interactive Services	6200
Central Advising Office (Phone-in)	HELP	1200 Baud Interactive Services	3959
Microcomputer Support Group	5071	DATAPAC	4320, 0056
System Status Enquiries (DEC)	4318	Telenet	0302043200056
System Status Enquiries (IBM)	7393	Tymnet	<backspace> DPAC;302043200056

UTCS Directory

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Systems	Bill Lauriston	MP331	3579
User Interface	Don Gibson	MP350	7331

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Natural Language Processing Steering Committee	Chairman	Prof. I. Lancashire	828-5273
UTCS Users' Committee	Chairman	Prof. J.C. Hurd	3056
	Secretary	Ms. C. Pereira	4463

UTCS Terminal and Advising Sites

Names and Locations

- **Central Advising Office (CAO), 978-HELP**
- **Education Facility (Educ)**, McLennan Labs, 60 St. George St., Room 221
- **Engineering Annex (EAT, EUT, CDF)**, 11 King's College Road, Rooms 103, 104, 107, 107B, 201, 203.
- **Erindale College (Erin), 828-5339**, Mississauga Road, Erindale Campus, Rooms 2005, 2039, 2045
- **Robarts**, Robarts Library, 130 St. George St., Room 1061A
- **Scarborough College (Scar), 284-3122**, Military Trail, Scarborough Campus, Rooms S624, S625, S627, S628, S628A
- **Sidney Smith (AST & ASUT)**, 100 St. George St., Rooms 1071, 1073, 2104, 2105
- **St.Michael's College**, 121 St. Joseph St., Room 101
- **Trinity College**, 6 Hoskins Ave., Room 024
- **Victoria University**, 73 Queens Park Cres., Room 005.

Sites	**Hours of Operation**				**Restrictions***	**Advising**
	Mon-Thurs	Fri	Sat	Sun		
AST	8:00-22:00	8:00-22:00	8:00-22:00	8:00-22:00	Research	978-HELP
ASUT	7:00-24:00	7:00-24:00	7:00-24:00	7:00-24:00	BICS	Arranged by Dept.
CAO	10:00-18:00	10:00-18:00	closed	closed	Research	978-HELP
CDF	24 hrs	24 hrs	24 hrs	24 hrs	Under	No
EAT	24 hrs	24 hrs	24 hrs	24 hrs	Research	Rm 106
Educ	24 hrs†	24 hrs†	24 hrs†	24 hrs†	Research**	978-HELP
(outer)	24 hrs†	24 hrs†	24 hrs†	24 hrs†	Research	978-HELP
Erin (2039)	9:00-17:00	9:00-17:00	24 hrs	24 hrs	Research	Rm 2005
(2045)	24 hrs	9:00-17:00	24 hrs	24 hrs	Undergrads	Rm 2005
Robarts	8:30-24:00	8:30-24:00	9:00-17:00	13:00-22:00	BICS, Micros	Arranged by Dept.
Scar	9:00-24:00	9:00-24:00	10:00-17:00	closed	Research	Rm S624, S626
					Undergrads	Rm S624
St.Michael's	24 hrs	24 hrs	24 hrs	24 hrs	None	Arranged by College
Trinity	8:00-22:00	8:00-22:00	8:00-22:00	8:00-22:00	None	Arranged by College
Victoria	8:30-23:00	8:30-23:00	closed	closed	None	Arranged by College

* Research includes graduates, faculty, staff. ** May be unavailable due to UTCS courses.
† Building open Mon. - Thurs. 7:00 - 22:00, Fri. 7:00 - 17:00, Building closed Sat. & Sun.

Advising Hours

CAO	Monday through Friday, 10:00 - 18:00
EAT	Monday through Friday, 13:00 - 17:00 (Oct. - mid Dec., Jan. - Apr.)
Scar	Monday through Friday, 09:00 - 17:00
Erin	Mon. 09:00-17:00, Tues.-Thurs. 09:00-20:00, Fri. 09:00-17:00, Sat.-Sun. 12:00-16:00.

Services Available
(Y=yes, N=no)

	BICS	**Keypunch**	**PACX**	**Printers**	**Writer's Workbench**	**Terminal Server Network**	**DCS Micros**
AST	N	N	N	Y	N	Y	N
ASUT	Y	N	N	Y	N	N	N
CDF	N	N	N	Y	N	N	N
EAT	N	Y	N	Y	N	Y	N
Educ	N	N	Y	N	N	N	N
Erin	N	N	Y	Y	N	N	N
EUT	Y	N	N	N	N	N	N
Robarts	Y	N	N	Y	Y	N	Y
Scar	N	N	Y	Y	N	N	N
St.Michael's	Y	N	N	Y	N	N	N
Trinity	Y	N	N	Y	N	N	N
Victoria	Y	N	N	Y	N	N	N

UTCS Systems

3033/N12 Processor

- located in McLennan Physical Laboratories
- provides General Purpose Job Stream, TSO, WYLBUR, APL
- 12 megabytes of memory
- MVS with JES2

3033/U16 Processor

- located in McLennan Physical Laboratories
- provides instructional access using BICS
- 16 megabytes of memory
- UTS (modified UNIX Seventh Edition) under VM/370

4341 Mod II Processor

- located in McLennan Physical Laboratories
- provides administrative IMS/VS, DB/DC, Batch and TSO
- 16 megabytes of memory
- MVS with JES2

DECsystem-10 Model 1090

- located in McLennan Physical Laboratories
- provides General Purpose Time-Sharing
- 512 K - 36 bit words of memory
- TOPS-10 operating system, version 7.02
- GALAXY queuing, spooling, and Batch subsystem, Version 4.1

PDP-11/70 SAS UNIX

- located in McLennan Physical Laboratories
- provides UNIX Statistical Analysis Service (Dept. of Statistics only)
- 4 megabytes of memory
- UNIX Seventh Edition

"Hub VAX" (11/750)

- located in McLennan Physical Laboratories
- provides backup, program testing, and intercommunication relating to student services
- 3 megabytes of memory
- VMS

GP UNIX

- located in McLennan Physical Laboratories
- provides General Purpose Timesharing
- UNIX (VAX-11/750)
- typesetting hardware (CAT/8), and (Varian) for previewing output

Computer Disciplines Facility

VAX-11/750 (4 megabytes of memory)
VAX-11/750 (2 megabytes of memory)
VAX-11/780 (4 megabytes of memory)

- located in Engineering Annex
- provide Computer Science interactive access
- UNIX (Berkeley Unix 4.2BSD)

Communications & Technical Support

- located in Sandford Fleming Building, Fourth Floor
- Communications Group provides communications systems, terminals, modems, data channels: consulting and installation.
- Field Service Group installs and maintains small computer systems on a contract basis or on a cost-per-call basis.
- provides consulting on minicomputers; configures and installs minicomputer systems

Microcomputer Facility

- located in McLennan Physical Laboratories
- provides consulting on microcomputer systems
- offers media conversion services
- Machines include:
  IBM Personal Computer & PC/XT, APPLE IIe, Macintosh, TRS-80 Model 1, S-100 CP/M System, Osborne 1, Hyperion, Eagle Spirit, plus a variety of others on loan from suppliers

Scarborough College Systems

VAX-11/750 (5 megabytes of memory)
VAX-11/750 (2 megabytes of memory)

- provides instructional access using UNIX (Berkeley Unix 4.2BSD)

Erindale College Systems

VAX-11/780 (4 megabytes of memory)

- provides instructional access using VMS
- Research access

VAX-11/750 (5 megabytes of memory)

- provides instructional access using UNIX (Berkeley Unix 4.2BSD)

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